PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 5/222, 5/225 — A1

(11) International Publication Number: WO 96/31050

(43) International Publication Date: 3 October 1996 (03.10.96)

(21) International Application Number: PCT/US96/03789

(22) International Filing Date: 21 March 1996 (21.03.96)

(30) Priority Data:
08/409,667 24 March 1995 (24.03.95) US

(71) Applicant: LIGHTSTORM TECHNOLOGIES, INC. [US/US]; 919 Santa Monica Boulevard, Santa Monica, CA 90401 (US).

(72) Inventors: CAMERON, Michael, H.; 3100 Damon Way, Burbank, CA 91505 (US). CAMERON, James, F.; 919 Santa Monica Boulevard, Santa Monica, CA 90401 (US).

(74) Agents: BLATT, Jeffrey, J.; Irell & Manella, c/o Lyon & Lyon, Attn: Rafter, John, A., Jr., Suite 4700, 633 West Fifth Street, Los Angeles, CA 90071-2066 (US) et al.

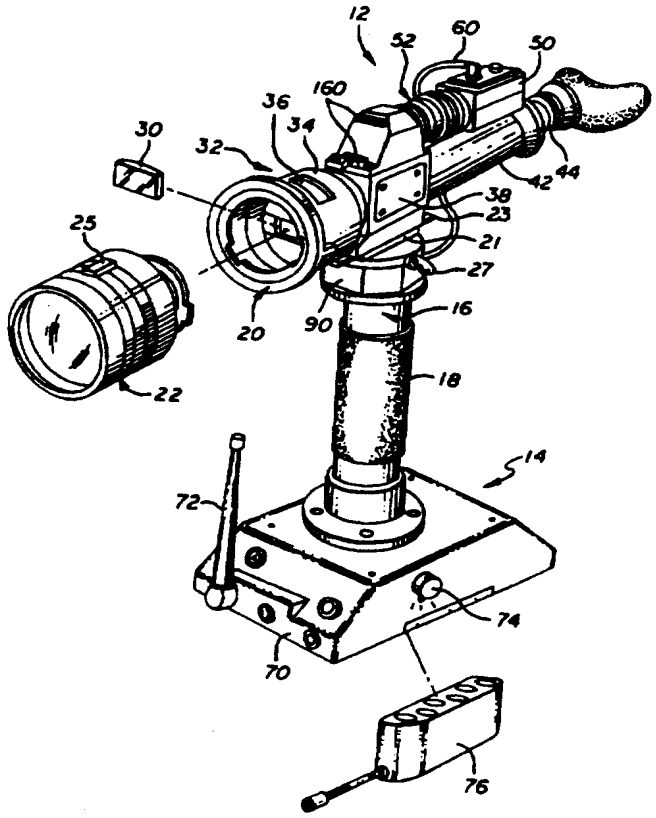
(81) Designated States: AU, CA, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: VIDEO VIEWFINDER

(57) Abstract

A hand-held video viewfinder for simultaneously viewing a scene and recording the scene using a video camera (50) is disclosed. An optical assembly (12) includes an optical housing body having a lens mounting bracket (20) for receiving a primary camera lens (22). The primary camera lens (22) is selected to correspond to the same motion picture or video lens which will be used during the actual filming of the particular scene. A removable ground glass relay lens (30) having visible etched format lines corresponding to the aspect ratio chosen for the particular production is received within a barrel-shaped receiving section (32) of the optical housing body. The ground glass relay lens (30) may be inserted and removed from the barrel-shaped receiving section (32). A sighting tube (44) is coupled to the optical housing permitting a user to view the scene by viewing the scene through the sighting tube (44), the ground glass relay lens (30) and the primary camera lens (22). A video camera (50) is coupled to the optical housing through an intermediate lens (52) and is provided with a view of the scene by a beam splitter and turning mirror disposed between the sighting tube (44) and the ground glass relay lens (30). The video camera (50) provides a video signal corresponding to the scene as viewed by the user through the relay lens (52) and the selected primary camera lens (22).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia
AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CS	Czechoslovakia
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgystan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakhstan
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam

DESCRIPTION

Video Viewfinder

Background of the Invention

1. Field

The present invention relates to the field of motion picture production systems, and more particularly, to motion picture production systems which permit a director to preview a scene for the placement of actors, action shots and/or special effects prior to actual filming.

2. Art Background

Special effects and action photography have played an important role in motion picture productions since the early days of the film industry. In recent years, box office hits such as *Terminator*, *Terminator II*, *The Abyss*, and *Aliens* testify to the captivating power of special effects and action photography, and underscore the significance of these types of motion pictures in contemporary film making.

To achieve the proper "feel" of a scene or action shot, including the placement of actors, lights and in many instances the motion of the motion picture camera, it is desirable for the director to accurately preview the scene prior to actual filming. Optimally, the director wishes to preview or "walk" the scene using the same lens which will be used on the motion picture camera. It is important to preview the scene using the same lens that will be used in the actual filming, since various lenses have characteristics which differ from lens to lens.

In the past, in order for a director to preview a scene to insure the proper placement of lighting, actors and camera movement, the selected lens was mounted onto the actual motion picture camera, and the director viewed the scene through the camera sighting system. However, this often proved to be impractical since it required

setting up the entire camera package to preview the scene for filming. In the case where a crane and dolly system was used, the laying of track for the dolly had to take place prior to the scene preview, and any further changes to the scene required movement of the tracks and dolly. Other alternatives which have been explored include the mounting of the motion picture lens on a sighting tube which is hand held by the director when previewing the scene. Unfortunately, a disadvantage of the sighting tube is that only the director is able to view the scene as it will be shot. Camera operators, lighting engineers and actors are unable to simultaneously preview the scene prior to filming.

Accordingly, there exists a need for a device which permits a director to efficiently explore complex moves and to preview the scene for set-up, and thereby realize the director's artistic direction without the encumbrance of repeatedly moving cameras, tracks and dollies for each preview.

As will be described, the present invention provides a hand held apparatus which permits the simultaneous viewing of a scene and the remote recording of the scene using a video camera. The simultaneous viewing of the director's scene preview by a crew member with a monitor is extremely helpful in expediting an otherwise slow and costly process. By providing information about the scene instantly through video transmission, actors and crew members may quickly adapt to new scenes or changes as a group, with the same clear visual reference. The present invention has particular application for use in motion picture productions incorporating action scenes requiring camera movement, and provides the director with an efficient method for experimenting with various camera movements and recording a contemplated scene for later review.

Summary of the Invention

A hand held video viewfinder for simultaneously viewing a scene and recording the scene using a video camera is disclosed. An optical assembly includes an optical housing body having a lens mounting bracket for receiving a primary camera lens. The primary camera lens is selected to correspond to the same motion picture or video lens which will be used during the actual filming of the particular scene. A removable ground glass relay lens having visible etched format lines corresponding to the aspect ratio chosen for a particular production is received within a barrel-shaped receiving section of the optical housing body. The ground glass relay lens may be inserted and removed from the barrel-shaped receiving section. A sighting tube is coupled to the optical housing permitting a user to view a scene by viewing the scene through the sighting tube, the ground glass relay lens and the primary camera lens. A video camera is coupled to the optical housing body through an intermediate lens and is provided with a view of the scene by a beam splitter and turning mirror disposed between the sighting tube and the ground glass relay lens. The video camera provides a video signal corresponding to the scene as viewed by the user through the relay lens and the selected primary camera lens.

A base is coupled to the optical assembly by a post having a gripping portion comprised of a rubberized material. The base provides a counter mass balance for the optical assembly to stabilize the viewfinder when gripped by a user. The base accepts and houses electronic components, including a removable transmitter assembly having an antenna to transmit the video signal generated by the video camera to one or more remote receivers that may be in turn coupled to video recorders. The video recorders and receivers may be stationary, or may take the form of hand held video recorders carried by cast and/or crew members on a set. The electronics disposed within

the base includes a frame line generator for generating frame lines corresponding to selected aspect ratios used in motion picture and other productions. The frame line generator inserts selected frame lines in the output video signal prior to transmission to the remote receiver. A selector switch is provided in the base to permit the user to select preset aspect ratio formats generated by the frame line generator. The electronics further includes a character and a graphic generation circuit for inserting alpha-numeric characters and graphics in the output video signal. The video camera and supporting electronics disposed in the base are powered by a removable Nicad battery pack which is received in the underside of the base.

In an alternative embodiment, a charge coupled device (CCD) camera and video electronics are disposed within the post assembly. In yet another alternative embodiment, a rotatable pellicle is capable of directing light in opposite directions, depending upon the position of the pellicle. In this manner, an image may be directed toward a camera disposed beneath the optical assembly or above the optical assembly, allowing a director to choose which configuration is superior for a particular scene.

In operation, a director wishing to preview a scene selects a primary camera lens which is to be used during actual filming. An appropriate ground glass relay lens having the desired aspect ratio etched therein is inserted into the receiving barrel. The director then switches on the supporting electronics and video camera, and selects one or more aspect ratio formats to be inserted into the output video signal. The director may choose to optically view the scene through the sighting tube, or alternatively, to view the scene holding a hand held monitor or an external attached monitor, such as a small monochrome or color CCD or LCD screen. The scene may then be previewed and viewed by the director as well as others, including camera operators, special effects consultants, lighting

specialists and actors using remote receivers. Once the scene is previewed, if the director is not satisfied with the location of actors, lighting, or other scene parameters or desires to substitute a different primary lens, the director may do so and then re-walk the scene until satisfied that all of the necessary elements for a successful shot are present.

Brief Description of the Drawing

Figure 1 is a perspective view of a preferred embodiment of the video viewfinder of the present invention including a removable ground glass relay optic element and a removable motion picture camera lens.

Figure 2 is a partial cross-section of the preferred embodiment of the video viewfinder of the present invention illustrating the optical path whereby a user and a video camera simultaneously view a scene through the motion picture camera lens.

Figure 3 is a block diagram illustrating the electrical and optical systems of the preferred embodiment of the video viewfinder of the present invention.

Figure 4 illustrates a view through the optical path of the preferred embodiment of the video viewfinder of the present invention, including format lines for a selected aspect ratio chosen for a motion picture production.

Figure 5 illustrates the view of a scene as recorded by the preferred embodiment of the video viewfinder of the present invention's video camera, wherein the video image includes format lines for a selected aspect ratio as generated by a frame line generator.

Figure 6 illustrates the preferred embodiment of the video viewfinder of the present invention's use of a character generation circuit and a graphic generator to electronically insert additional data into the video output of the present invention.

Figure 7 illustrates the preferred embodiment of the video viewfinder of the present invention's use of multi-

ple format lines generated by the frame line generator of the present invention, and the use of selected shading to identify "out of scene" objects within the field as recorded by the video camera.

Figure 8 is a cross-section illustrating the optical path of the preferred embodiment of the present invention.

Figure 9 illustrates the preferred embodiment of the present invention's low mode wherein a user may invert the preferred embodiment of the present invention using a handle attached to the bottom of the base.

Figure 10 illustrates a dovetail coupling mechanism when the preferred embodiment of the present invention is utilized in a low mode viewing arrangement.

Figure 11 illustrates an alternate embodiment of the present invention.

Figure 12 illustrates a cross section of the embodiment of Figure 11.

Figure 13 illustrates an exploded assembly drawing for the pellicle illustrated in Figure 12.

Figure 14 is a side view of the embodiment of Figure 11, illustrating a de-anamorphic lens assembly.

Figure 15 illustrates a coupling mechanism for the optical body and post assembly illustrated in Figure 11.

Figure 16 is another alternate embodiment of the present invention.

Figure 17 is a further alternate embodiment of the present invention.

Detailed Description of the Preferred Embodiments

An apparatus for simultaneously viewing a scene and recording the scene using a video camera, having particular application in motion picture production is disclosed. In the following description, numerous details are set forth such as optical elements, electronic components, mechanical structures and operational details, etc., to provide a full understanding of the present invention. In some instances, well known circuits and structures are not

described in detail in order not to obscure the preferred embodiment of the present invention unnecessarily.

Referring now to Figure 1, one preferred embodiment of the present invention includes an optical assembly referred to generally by the numeral 12, and a base 14 including an electronic assembly referred to generally by the numeral 14. As illustrated, the optical assembly 12 and the electronic assembly 14 are coupled to one another by a post assembly 16. The post assembly 16 includes a handgrip 18, which in the present embodiment, comprises a foam or rubberized material to permit a sure grip by a user of the preferred embodiment of the present invention. In the present embodiment, the post assembly 16 may be telescoped to lengthen or shorten its overall length as desired by a user. As shown in Figure 1, the optical assembly 12 is coupled to the post assembly 16 by a grooved dovetailed slide 21 which is received by a corresponding dovetail 23 on the underside of the optical assembly 12. For adjustment of the center of gravity (CG), the optical assembly may be moved along the dovetail slide 21 and secured at a desired location through the use of a dovetail thumb cam 27.

As shown in the perspective view of Figure 1, the optical assembly 12 includes a lens mounting bracket 20 for receiving a primary camera lens 22. This lens mounting mechanism is quickly replaceable with a variety of lens mount adapters to accept current and future lenses. The primary camera lens 22 is selected by the director to correspond to the same (or equivalent) motion picture or video lens which will be used during the actual filming of a particular scene. The primary lens 22 illustrated in Figure 1 comprises a zoom lens which is further provided with a zoom lens signal generator 25, which as will be described, provides signals indicative of the zoom position of the lens to the electronics of the preferred embodiment of the present invention. In practice, the preferred embodiment of the present invention is designed

to accept motion picture camera lenses from a variety of manufacturers and lens providers, including but not limited to, ARRI®, Panavision®, Ziess®, Canon® and Nikon®.

A removable ground glass relay lens 30 includes visible etched format lines corresponding to the aspect ratio chosen for a particular production, and is received within a barrel-shaped receiving section 32. The barrel-shaped receiving section 32 includes an external rotating barrel 34 having a cutout area 36. By rotating the external barrel 34, the cutout section 36 may be placed over a ground glass removal and installation access port (not shown), and the ground glass relay lens 30 may be inserted and removed from the receiving section 32.

The barrel-shaped receiving section 32 is coupled to an optical housing body 38 which is provided with appropriate mounting brackets to accept the various components comprising the preferred embodiment of the present invention. As shown, a sighting tube 42 is coupled to the optical housing body 38. Sighting optics 44 are coupled to the sighting tube 42 permitting a user to view a desired scene through the primary camera lens 22 by viewing the scene through the sighting tube 42 and the ground glass relay lens 30, as will be described.

As further shown in Figure 1, a video camera 50 is coupled to the optical housing 38 through an intermediate lens 52, and permits the simultaneous recording of a scene as viewed by a user sighting through the sighting tube 42. A power/video cable 60 is coupled to the video camera 50 for providing power to the video camera and for providing the output video signal to the electronics of the preferred embodiment of the present invention.

Continuing to refer to Figure 1, the base 14 is designed to provide a counter-mass balance for the optical assembly 12, and thereby stabilize the preferred embodiment of the present invention when gripped at grip 18 by a user. The base 14 accepts and houses the electronic components of the preferred embodiment of the present

invention, including a removable transmitter assembly 70 having an antenna 72 to transmit the video signal to a remote receiver and a video recorder. The transmitter assembly 70 also may transmit signals to a remote receive through a microwave link (not shown). The base 14 further includes a selector switch 74 to permit the user to select one of a number of preset aspect ratio formats provided by a frame line generator disposed within the electronics in the base 14. The electronics are powered by a removable Nicad battery pack 76 which is received in the underside of the base 14.

Referring now to Figure 2, the optical path of the preferred embodiment of the present invention is shown in more detail. The image of a scene is captured by the primary camera lens 22 and is focused on the ground glass relay lens 30. Light transmitted from the ground glass relay lens 30 is optically coupled to a beam splitter 80, which, in the presently preferred embodiment comprises a 50/50 beam splitter with anti-reflective coatings. In place of the beam splitter 80, it will be appreciated that other functionally equivalent optical elements may be used, such as a prism, pellicle or the like, including combinations thereof. Light which is reflected by the beam splitter 80 is reflected onto a 45 degree turning mirror 82 which results in the light turning 90 degrees, and is received by the intermediate lens 52 coupled to the video camera 50. In the presently preferred embodiment, the video camera 50 comprises a CCD video camera including a CCD element 84 having high pixel resolution. It will be appreciated by one skilled in the art, that a variety of video and still cameras may be utilized using the apparatus of the preferred embodiment of the present invention depending upon the application in which the preferred embodiment of the present invention is used. Moreover, various die sizes of the CCD element 84 may be used to accommodate various motion picture or video primary lenses. Light which passes through the beam splitter 80

is passed through the sighting tube 42 and the sighting optics 44 to the user 86.

As will be noted, the structure of the preferred embodiment of the present invention permits the user 86 to view the scene through the primary camera lens 22, and to simultaneously record the same scene using the video camera 50. The camera 50 transmits a NTSC/PAL or SECAM video signal over cable 60 to a junction box 90, as shown in Figure 1, where the signal is coupled to a triax cable 92 which passes through the post assembly 16 into the base 14, and is in turn coupled to the electronics disposed therein. The video camera output is then provided to video distribution switches routing the signal through a frame line generator printed circuit board 94, and a character generator circuit board 96, and on to the transmitter assembly 70 for transmission to a remote receiver.

Referring now to Figure 3, there is shown in block diagram form the integrated optical and electrical components of the preferred embodiment of the present invention. The output from the video camera 50 is comprised of a NTSC, PAL or SECAM video signal 100 which is coupled through the junction box 90 to a switch 102. When closed, the switch 102 couples the video signal to the input of a character-generator circuit 104, and is also coupled to a graphic generator circuit 106 and a frame line generator 108. The battery pack 76 is coupled to the electronics of the preferred embodiment of the present invention, including the character generator 104, the graphic generator 106 and the frame line generator 108, as well as to the transmitter 70. A sensor 110 is provided between the battery pack 76 and to a switch 112, such that during charge of the batteries, switch 112 is opened thereby disconnecting the battery pack 76 from the electronics of the preferred embodiment of the present invention to protect against potential power surges and damage to the circuit components. In the presently preferred embodi-

ment, the Nicad battery pack 76 charges up to 3 amps at 14 volts, and provides a 750 milliamp output.

Continuing to refer to Figure 3, the frame line generator 108 includes a hold circuit 114 which permits the simultaneous generation and insertion of multiple aspect ratio formats in the output video signal provided by video camera 50. In the presently preferred embodiment, a user 86 places switch 74 in a position to select one of the preset aspect ratio formats. The user then presses a hold button activating the hold circuit 114, and may then use switch 74 to select another aspect ratio format for simultaneous insertion in the video output signal.

As illustrated, the output of the frame line generator 108, graphic generator 106 and character generator 104 are coupled to the transmitter 70 for transmission to a remote receiver 120. It is contemplated that the transmitter 70 may transmit signals to the remote receiver 120 using radio frequency (RF) microwave, optical or other appropriate wavelengths as required by the particular application in which the present invention is used.

The receiver 120 is coupled to a display monitor 122 and a video recorder 124. In operation, it has been found that the principal advantage of transmitting the video signal to a hand held recorder is ease of use by the director and other users. When walking through a scene or contemplated camera shot, the video signal output is transmitted to the remote receiver 120 and recorded by the video recorder 124. Multiple receivers, which may also be coupled to video recorders, can be used to permit the simultaneous viewing of the contemplated scene by camera operators, actors, lighting specialists and others on the set. Upon completion of the scene walk through the director may simply hand the preferred embodiment of the present invention to a camera assistant without having to disconnect cables or other lines. In practice, it has been found that a receiver/recorder combined system such

as the Sony® GV-8 system, having a liquid crystal display screen, may be utilized as both a receiver, monitor and video recorder.

The preferred embodiment of the present invention may also be used to transmit high resolution images from the transmitter 70 to a computer base station 125 coupled to the receiver 120 for digitally storing and manipulating the scene images. For example, the digital scene images may be stored on magnetic disc and edited using a non-linear editor 126 such as the Sony "Destiny"® non-linear editor, or equipment manufactured by AVID®, among others.

Referring now to Figure 4 and Figure 2, a user viewing a scene through the optical assembly 12, including the sighting tube 42, the ground glass relay lens 30 and the primary camera lens 22, generally views the scene as illustrated. As shown, the primary camera lens field of view is defined by the outer border 130 which is the limit of the scene as viewed by the lens 22, and also simulates the full aperture view as would be obtained by the motion picture camera to be used. An inner black format line 135 is visible to the user 86, and represents the selected aspect ratio format for the particular production. In the motion picture and television industry, certain aspect ratios are selected by directors or are required by certain productions. For example, the Super 35 format permits an aspect ratio of 2.35:1 whereas television aspect ratios are 1.33:1.

As illustrated in Figure 4, a user 86 when sighting through the sighting tube 42 and the primary camera lens 22 can easily determine how much of the body of an actor 140 or any set elements will fall within the selected aspect ratio format by viewing the black format line 135. The user can also view how much of the scene will fall outside of the selected aspect ratio, but still be within the viewing area, and thereby be captured by, the primary camera lens 22. Thus, the user 86 may view the contemplated scene using the optical assembly of the preferred

embodiment of the present invention, and experiment with various motion picture lenses to select the optimum lens for the particular scene. It will be recalled that the aspect ratio format line 135 is generated by the ground glass relay lens 30 being etched to have a black border with the appropriate ratio disposed thereon.

Referring now to Figure 5, the scene as viewed by monitor 122 and recorded by the video recorder 124 is illustrated. The frame line generator 108 of the preferred embodiment of the present invention generates a selected aspect ratio format. In the illustration, the selected aspect ratio format has been chosen to be the same as that provided on the ground glass relay lens 30. The frame line generator 108 generates the aspect ratio format and adds a rectangular white border 142 enhancement signal to the NTSC, PAL or SECAM video signal to accent the desired film format boundaries. The frame line generator format image (white video) overlays the etched black lines and is superimposed on the ground glass relay lens 30, thereby rendering the format highly visible on the received video. The use of the frame line generator 108 and the overlay of the frame line generated format image in white video avoids potential problems associated with perceiving the etched black lines on the ground glass relay lens 30 in the video signal, particularly in low light filming conditions.

Referring now to Figure 6, the character generator 104 and the graphic generator 106 may be used to add alphanumeric characters to the output NTSC, PAL, SECAM video signal transmitted by the transmitter 70 and received by the receiver 120. In the example illustrated, a battery indicator graphic 150 has been inserted into the output video signal to permit the viewer to monitor the remaining battery life. Similarly, the character generator 104 may be used to insert characters representing, for example, the size of the current lens (in Figure 6, 25 mm) being utilized as the primary camera lens 22. In addition, as

previously noted in Figure 1, a zoom lens signal generator 25 may be provided if a zoom lens is used, and its output coupled to the electronic package of the preferred embodiment of the present invention such that the current zoom position and respective lens focal length is inserted into the video field by the character generator 104.

Referring now to Figure 7, the preferred embodiment of the present invention further permits multiple aspect ratio formats to be simultaneously displayed in the video output. As previously described with reference to Figure 3, the frame line generator 108 includes a hold circuit 114 wherein the user may select an aspect ratio format, activate the hold circuit 114 and select another aspect ratio format for simultaneous display. In the example shown in Figure 7, the aspect ratio format for Super 35 is illustrated by reference number 142. The television standard aspect ratio of 1.33:1 is illustrated as an overlaid white border 152. The frame line generator 108 further may be selected to provide "half paint" which refers to the dimming of regions of the video image outside of and surrounding the border frame line generator aspect ratio formats being displayed. In Figure 7, this half-painted area is referred to generally by the numeral 156. Through the use of half-painting, the subject 140 remains visible in the entire field of view 130 of the primary camera lens 22, but is not as prominent as in the primary area of interest, namely within the selected aspect ratio formats. Thus, the use of half painting allows the director using the preferred embodiment of the present invention to be aware of set pieces, such as microphones or the like, or actors, which may be just out of frame but still present on the video image. Since the director is recording the image as he walks through the scene, such additional background information is very useful to actors who then may view the replay of the scene and check their locations within the field of view.

Referring now to Figure 8, the preferred embodiment of the present invention may be inverted into a "low mode" for additional flexibility in previewing scenes and filming action shots. A bracket 160 receives a support rib 165. Support rib 165 includes a longitudinally extending receiver 166 for receiving a dovetail flange 170 (see Figure 10, and in Figure 1, see dovetail 23). As best shown in Figures 9 and 10, the optical assembly 12 is thus inverted for use in a low mode. A handle 175 is secured to the bottom of the base 14 and the antenna 72 is inverted. In the low mode configuration, the user holds handle 175 and passes the lens so it stays close to the floor, table, actor's shoulder, or the like, as required by the shot. The user may view the image provided by video camera 50 using the remote receiver 120 and monitor 122. It will be appreciated that by inverting the optical assembly 12 of the preferred embodiment of the present invention in the manner illustrated, there is no need to reverse or invert the video image provided by the video camera 50. However, the current design of the preferred embodiment of the present invention offers the ability to electronically create a reverse oriented image if so desired. A cross-section of the optical assembly in a low mode configuration is illustrated in Figure 9.

In operation, a director wishing to preview or "walk" a scene selects a motion picture camera or other lens which he is considering utilizing during actual filming. An appropriate ground glass relay lens having the desired aspect ratio etched therein is inserted into the barrel 32. Switches 112 and 102 are placed in an "on" position thereby providing power to the electronic and video systems of the preferred embodiment of the present invention. The director further selectively opens or closes switches 105, 107 and/or 109, and selects one or more aspect ratio formats to be inserted into the output signal of the video camera 50. The director may choose to optically view the scene through the sighting tube 42, or

alternatively, to view the scene as recorded by the video recorder 124 by holding a hand held monitor 122 coupled to the receiver 120. The director further may adjust the center of gravity for the preferred embodiment of the present invention by sliding the optical assembly 12 along the dovetail mount 23, and securing the optical assembly to the post assembly 16 by camming the dovetail from cam 27.

Once the director is satisfied with the balance of the preferred embodiment of the present invention's assembly, the scene may be walked by the director and viewed, and then subsequently reviewed, by the director as well as others, including camera operators, actors, special effects consultants, and lighting specialists by viewing the images recorded by the video recorder 124. Alternatively, multiple receivers and monitors may be provided on the set such that each of the respective individuals who are required to perform a function during the shooting of the scene are able to simultaneously view the director's walk through. If the director is not satisfied with the location of actors, lighting or desires to substitute a different motion picture lens, he may do so and then re-walk the scene until he is satisfied that all of the necessary elements for a successful shot are present. As previously described, the director may also invert the optical assembly and place it in a low mode, supporting the assembly using handle 175.

Figure 11 illustrates an alternative embodiment which may be employed to facilitate transformations between normal mode and low mode operations. A hand held post 212 is mounted to a base 202 that receives light from an optical body 214 through a lens assembly 215. The hand held post 212 includes an electronic image reversing circuit 216 to correct an image in a right to left orientation while the base 202 includes other electronics previously described with reference to Figures 1 and 2. A CCD camera 215 is disposed within the hand held tube

212. A polarized positive lock cap 190 provides for easy transformation to a low mode operation. A door 232 provides for removal of a de-anamorphizer lens assembly and selector mechanism 230, illustrated in Figure 14. The de-anamorphizer lens assembly and selector mechanism 230 provides for the correction of anamorphic lenses prior to image splitting.

Figure 12 is a cross section of the embodiment illustrated in Figure 11. A pellicle 200 mounted within the optical body 214 may be rotated 90 degrees such that th pellicle 200 may be disposed at an angle of 45 degrees to the incoming light in two different positions. When the pellicle 200 is oriented as shown in solid lines in the figure, approximately fifty percent of the incoming light is reflected through the post towards the base assembly. Conversely, for use in low mode operation, when the pellicle 200 is oriented as shown in dashed lines in the figure, approximately fifty percent of the incoming light is reflected in a direction opposite that of the base assembly 202.

Figure 13 illustrates a frame assembly that permits the pellicle 200 to rotate through a 90 degree angle. A pressure tab 206 is coupled to the pellicle 200 and locks into a detent area of a mounted rotating indexer 204. The pressure tab 206 is coupled to an external lever 202 that may be rotated to cause the pellicle 200 to rotate.

Returning to Figure 12, the hand held post 212 is coupled to the optical body through an indexing flange 210 and a positive lock ring 208. Figure 15 is an expanded view of the indexing flange 210 and the positive lock ring 208. An outer surface 220 of the positive lock ring 208 may be knurled to enhance finger gripping. The indexing flange 210 includes flange units 222 and 224 of different sizes and the positive lock ring 208 includes a polarizing pin 222. The flange units 222 and 224 and the polarizing pin 222 ensure high precision final orientation of the CCD

camera 215 relative to the pellicle 200, as illustrated in Figure 12.

With reference to Figure 12, the hand held post 212 includes the electronic image reversing circuit 216 to correct an image in a right to left orientation, since the alternative embodiment illustrated in the figure does not include a secondary mirror as disclosed in the embodiment of Figure 1. Top to bottom image orientation is accomplished by location of the polarizing pin 222 at opposite poles from the positive lock ring 208 relative to the indexing flange 210. The focus and iris of the CCD camera 215 may be adjusted through two thumb wheel actuators, 218 and 219. Gear splines on the thumb wheel actuators 218 and 219 engage gear splines attached to the CCD camera 215 such that the focus and iris, respectively, of the CCD camera 215 are adjusted when the thumb wheel activators 218 and 219 are manually rotated.

Still with reference to Figure 12, the optical body 214 includes the de-anamorphizer lens assembly and selector mechanism 230, as previously described. Figure 14 is a side view of the optical body 214 and illustrates the de-anamorphizer lens assembly and selector mechanism 230. The de-anamorphizer lens assembly and selector mechanism 230 is coupled to the door 232. As previously described, the de-anamorphizer lens assembly and selector mechanism 230 provides for the correction of anamorphic lenses prior to image splitting.

Figure 16 illustrates another embodiment of the present invention. An optical body 242 includes a beam splitter 244 and an intermediate optical assembly 240 that adjusts an image provided to the beam splitter 244. The beam splitter 244 is displaced away from a lens 245 as compared with the embodiments previously described. Light which is reflected by the beam splitter 244 is reflected onto a 45 degree turning mirror 247 mounted above the beam splitter 244 which results in the light turning 90 degrees, and is received by an intermediate lens 248. The

intermediate lens 248 is coupled to a video camera 249 that, to improve the balance characteristics of the entire assembly, is mounted substantially above a hand held post 243. As described with reference to the previous embodiments, the hand held post 243 is coupled to a base 241 that stabilizes the entire assembly.

Figure 17 illustrates another alternate embodiment of the present invention. An optical assembly 250 includes a primary lens 258 and de-anamorphic lens assembly 260 that provide light to a beam splitter 252. In turn, the beam splitter 252 provides light to a 45 degree turning mirror 254 mounted below the beam splitter 252. The turning mirror 254 reflects light to a micro-chip camera and miniature lens 256, mounted proximately to the turning mirror 254, that transmits a video image to remote locations. Finally, light that passes through the beam splitter 252 also passes through secondary lenses 260 and 262 that focus the light for a user.

Accordingly, apparatus and methods have been described for simultaneously viewing and recording the scene using a video camera. Although the present invention has been described with reference to Figures 1 through 17, it is contemplated that many changes and modifications may be made by one of ordinary skill in the art to the materials and arrangements of elements of the invention, without departing from the spirit and scope of the invention.

Claim

1. A hand held apparatus for simultaneously viewing a scene and recording said scene using a video camera, comprising:

viewing means for viewing said scene by a user of said apparatus, said video camera optically coupled to said viewing means to view said scene substantially as viewed by said user and providing a video output signal, said viewing means including a lens mount for removably receiving a primary camera lens, such that said user and said video camera views said scene as would a motion picture camera utilizing an equivalent primary camera lens;

a base coupled to said viewing means by a post assembly, including a first gripping element, said base housing electronic means for receiving said video output signal from said video camera and for providing power to said video camera, said base further acting as a counterbalance and image stabilizer for said viewing means when said user grips said apparatus at said first gripping element.

2. The apparatus as defined by Claim 1 wherein said viewing means further includes a removable ground glass element having visible format lines corresponding to a selected aspect ratio.

3. The apparatus as defined by Claim 2 wherein said viewing means further includes an optical element disposed between said primary camera lens and said video camera to permit said video camera and said user to view the same scene through said primary camera lens.

4. The apparatus as defined by Claim 3 wherein said electronic means includes a frame line generator for selectively providing frame lines in said video signal output from said video camera.

5. The apparatus as defined by Claim 4 wherein said frame lines correspond to an aspect ratio selected by said user.

6. The apparatus as defined by Claim 5 further including a battery disposed in said base to power said video camera and said electronic means.

7. The apparatus as defined by Claim 6 wherein said frame line generator may selectively provide multiple frame lines simultaneously in said video signal output.

8. The apparatus as defined by Claim 7 wherein said electronic means transmits said video signal to a remote receiver.

9. The apparatus as defined by Claim 8 wherein said remote receiver is coupled to a monitor for viewing said transmitted video signal.

10. The apparatus as defined by Claim 9 wherein said remote receiver is coupled to a video recorder to record said video signal.

11. The apparatus as defined by Claim 8 wherein said remote receiver is coupled to a computer for storing said video signal digitally.

12. The apparatus as defined by Claim 11 wherein a non-linear editor is used to edit said stored digital video signals.

13. The apparatus as defined by Claim 3 wherein said base includes a second gripping element such that a user may invert said apparatus by gripping said apparatus at said second gripping element.

14. The apparatus as defined by Claim 13 further including mounting means coupled to said viewing means and said base to permit said viewing means to be inverted, such that when said user grips said apparatus by said second gripping means said video camera views said scene as does said user, without the need to invert said video signal.

15. The apparatus as defined by Claim 13 wherein said optical element comprises a beam splitter.

16. The apparatus as defined by Claim 15 further including an intermediate optical assembly disposed between said primary lens and said beam splitter.

17. The apparatus as defined by Claim 7 wherein said electronic means may selectively invert or reverse said video signal prior to said transmission to said remote receiver.

18. A method for previewing a scene prior to filming, comprising the steps of:

providing a hand held apparatus for use by a user to preview said scene, said apparatus including viewing means for viewing said scene by said user, said viewing means including optical viewing means to permit said user to optically view said scene and video camera means for simultaneously recording said scene and providing a video output signal, said viewing means further including a primary camera lens mount for removably receiving a lens such that said user and said video camera views said scene through said primary camera lens;

said user activating said video camera to record said scene;

said user walking said scene while holding said hand held apparatus, said user walking said scene in a manner substantially similar to a contemplated final

scene, such that said scene is previewed and recorded by said video camera.

19. The method as defined by Claim 18 wherein said viewing means includes a ground glass element having visible format lines corresponding to a selected aspect ratio, said format lines being visible to said user and to said video camera.

20. The method as defined by Claim 19 wherein said apparatus further includes electronic means for selectively providing frame lines corresponding to a selected aspect ratio in said scene as recorded by said video camera.

21. The method as defined by Claim 20 wherein said hand held apparatus further includes a base coupled to said viewing means by a post, said base housing said electronic means and acting to at least partially counterbalance said viewing means when said user holds said apparatus by said post, said base additionally providing a stabilizing effect for said visual and video images.

22. The method as defined by Claim 21 wherein said viewing means further includes an optical element disposed between said ground glass element and said video camera and said user, to permit said video camera and said user to view the same scene through said primary camera lens.

23. The method as defined by Claim 22 further providing the step of said frame line generator selectively generating multiple frame lines corresponding to different aspect ratios in said video output signal from said video camera.

24. The method as defined by Claim 23 further including the step of transmitting said video signal to a remote receiver for viewing said video signal.

25. The method as defined by Claim 24 further including the step of transmitting said video signal to a remote hand held receiver for viewing said video signal, said user holding said remote hand held receiver in one hand and said apparatus in another hand when walking said scene.

26. The method as defined by Claim 25 further including the step of providing alternate grip means coupled to said apparatus for inverting said apparatus for use in a low mode.

27. The method as defined by Claim 26 further providing bracket means for inverting said viewing means on said post such that when said apparatus is inverted said scene is viewed by said video camera is not inverted relative to said user's view.

28. The method as defined by Claim 27 further including the step of transmitting said video signal to a remote receiver for digitally storing said video signal.

29. The method as defined by Claim 28 further including the step of editing said digitally stored video signal using a non-linear video editor.

30. A hand held apparatus for simultaneously viewing a scene and recording said scene using a video camera, comprising:

viewing means for viewing said scene by a user of said apparatus, said video camera optically coupled to said viewing means to view said scene substantially as viewed by said user and providing a video output signal,

said viewing means including a pellicle rotatably coupled to said viewing means, such that a transmitted portion of incident light passes through said pellicle and a reflected portion of incident light is reflected in a direction, said direction determined by the position of said pellicle;

a base coupled to said viewing means by a post assembly, including a first gripping element, said base housing electronic means for receiving said video output signal from said video camera and for providing power to said video camera, said base further acting as a counterbalance and image stabilizer for said viewing means when said user grips said apparatus at said first gripping element.

31. The apparatus as defined by Claim 30 wherein said coupling between said pellicle and said viewing means includes a frame assembly, said frame assembly including:

a pressure tab coupled to said pellicle;

a mounted rotating indexer with a detent area, said pressure tab locking into said detent area; and

an external lever coupled to said pressure tab.

32. The apparatus as defined by Claim 30 wherein said pellicle is capable of being rotated through an angle of 90 degrees such that said reflected light may be reflected in in directions 180 degrees apart.

33. The apparatus as defined by Claim 30 further comprising:

a primary lens; and

a de-anamorphic lens disposed between said primary lens and said pellicle.

34. A hand held apparatus for simultaneously viewing a scene and recording said scene using a video camera, comprising:

viewing means for viewing said scene by a user of said apparatus, said video camera optically coupled to said viewing means to view said scene substantially as viewed by said user and providing a video output signal, such that said user and said video camera views said scene as would a motion picture camera utilizing an equivalent primary camera lens;

a base coupled to said viewing means by a post assembly, including a first gripping element, said post assembly housing at least a portion of said video camera, said base housing first electronic means for receiving said video output signal from said video camera and for providing power to said video camera, said base further acting as a counterbalance and image stabilizer for said viewing means when said user grips said apparatus at said first gripping element.

35. The apparatus as defined by Claim 34 wherein said video camera is completely disposed within said post assembly.

36. The apparatus as defined by Claim 34 further comprising second electronic means for correcting an image in a right to left orientation, said second electronic means coupled to said video camera and disposed within said post assembly.

37. The apparatus as defined by Claim 34 further comprising two thumb wheel actuators coupled to said video camera and mounted to said post assembly, said two thumb wheel actuators capable of adjusting the focus and iris of said video camera.

38. The apparatus as defined by Claim 34 further comprising a locking ring mounted on said viewing means and a flange mounted on said post assembly, said flange

engaging said locking ring to secure said post assembly to said viewing means.

39. The apparatus as defined by claim 38 wherein said flange includes flange segments of varying size.

40. A hand held apparatus for simultaneously viewing a scene and recording said scene using a miniature video camera, comprising:

viewing means for viewing said scene by a user of said apparatus, said miniature video camera optically coupled to said viewing means to view said scene substantially as viewed by said user and providing a video output signal, such that said user and said video camera views said scene as would a motion picture camera utilizing an equivalent primary camera lens.

41. The apparatus as defined by claim 40 further comprsing a base coupled to said viewing means by a post assembly, including a first gripping element, said base further acting as a counterbalance and image stabilizer for said viewing means when said user grips said apparatus at said first gripping element.

42. The apparatus as defined by claim 41 further including electronic means for receiving said video output signal from said video camera, said electronic means housed within said base.

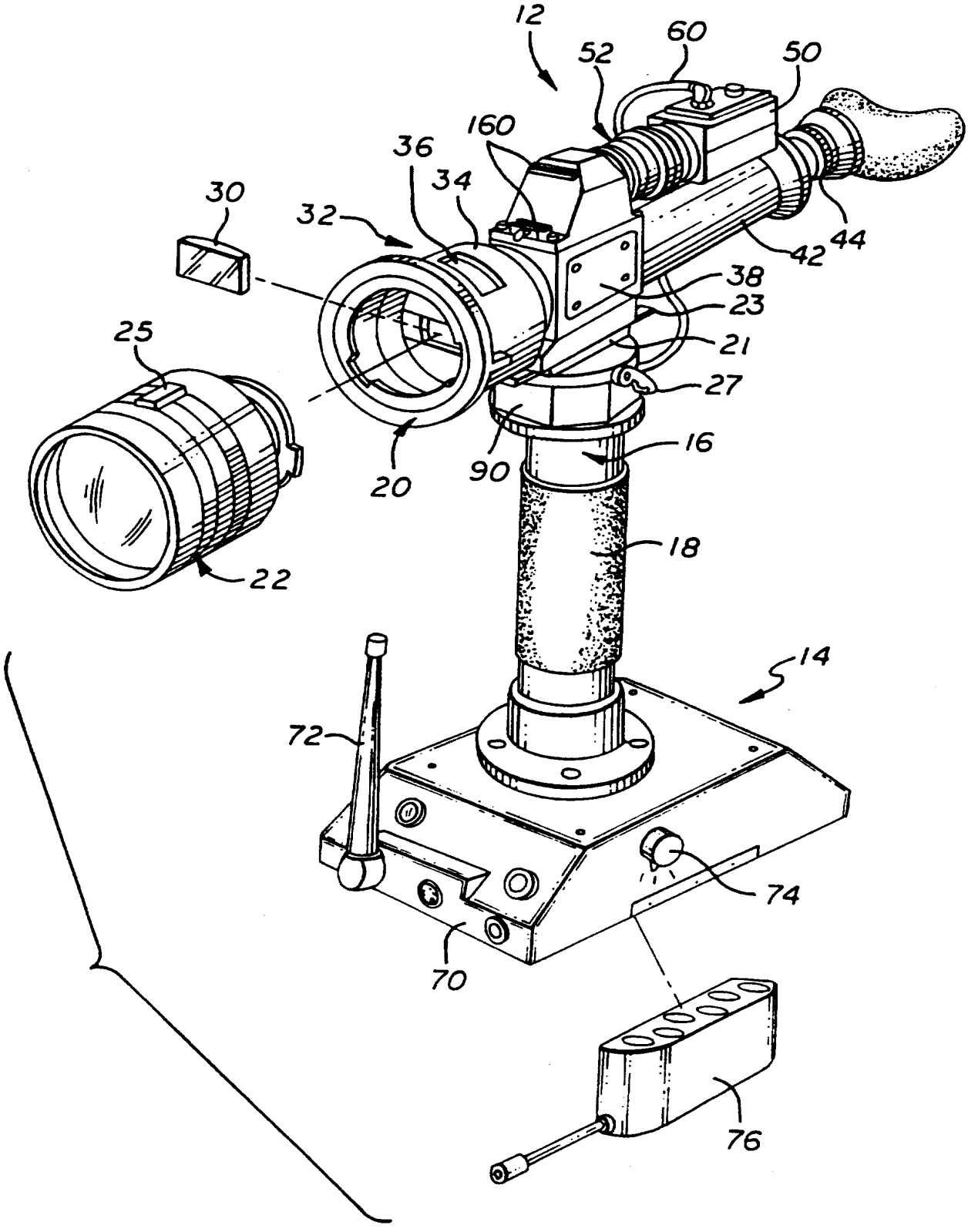
43. The apparatus as defined by claim 40 wherein said miniature camera is mounted within said viewing means.

44. The apparatus as defined by claim 43 further comprising:

a beam splitter for receiving light from an image; and

a turning mirror optically coupled to said beam splitter and said miniature video camera for providing light from said image to said miniature video camera.

FIG. 1



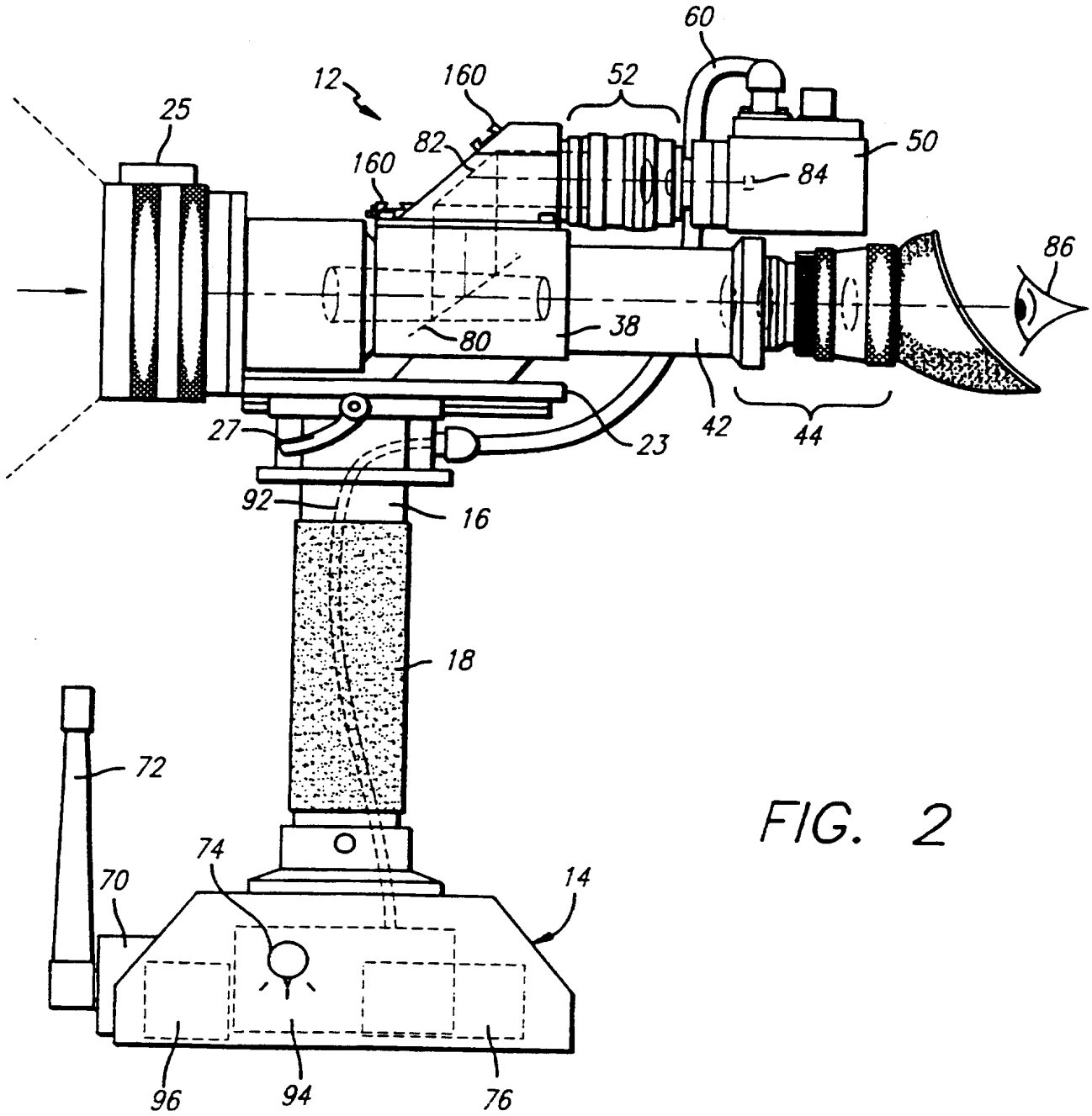


FIG. 2

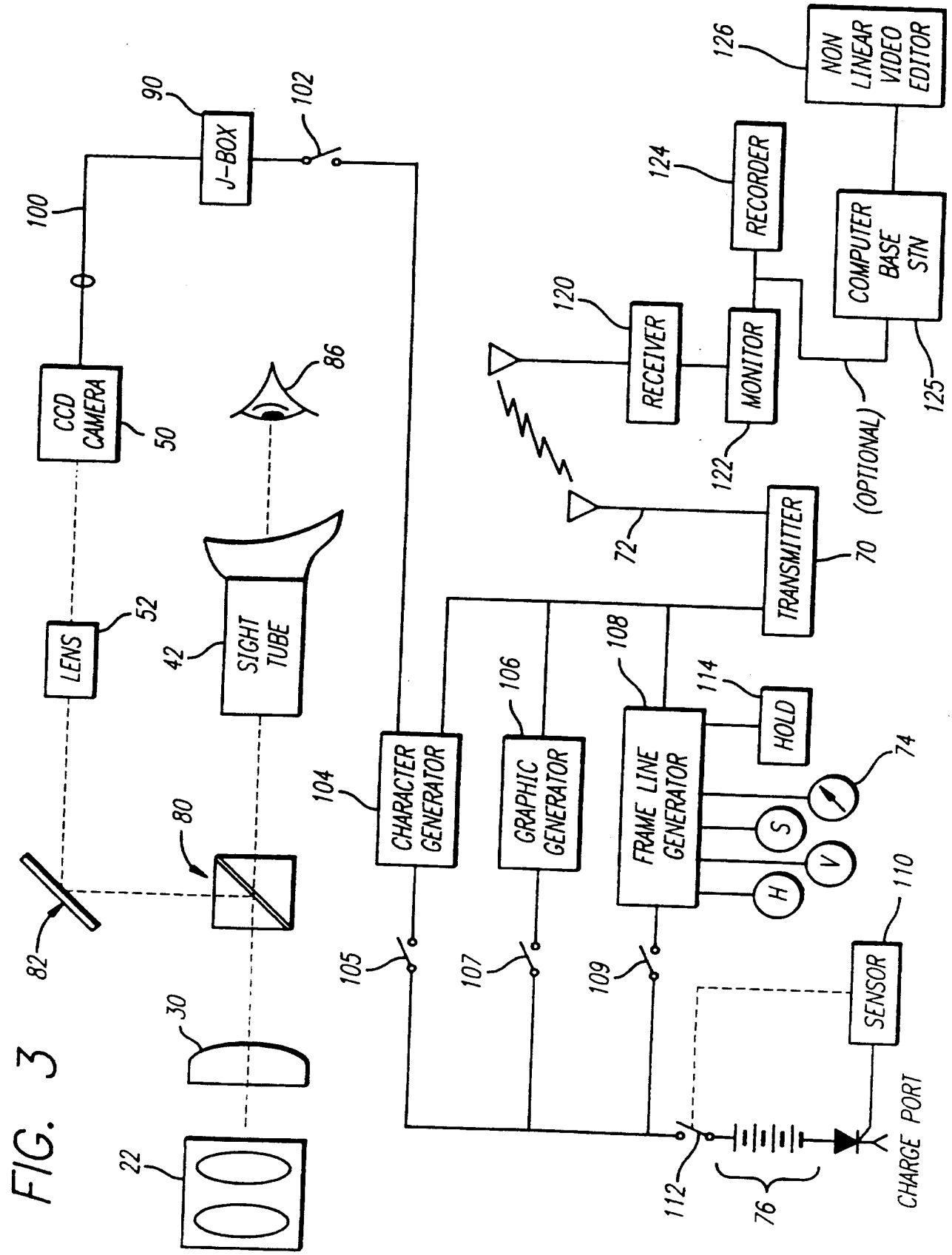


FIG. 3

FIG. 4

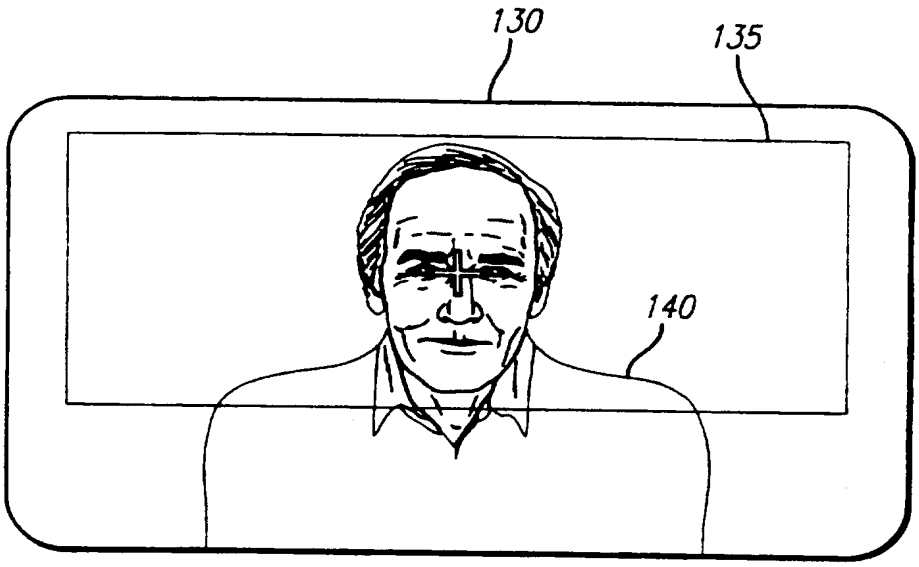


FIG. 5

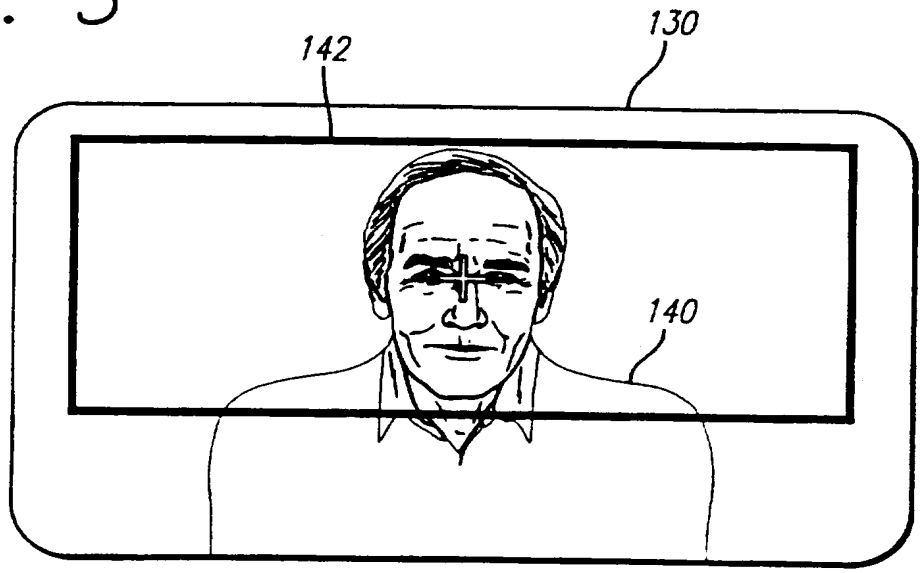


FIG. 6

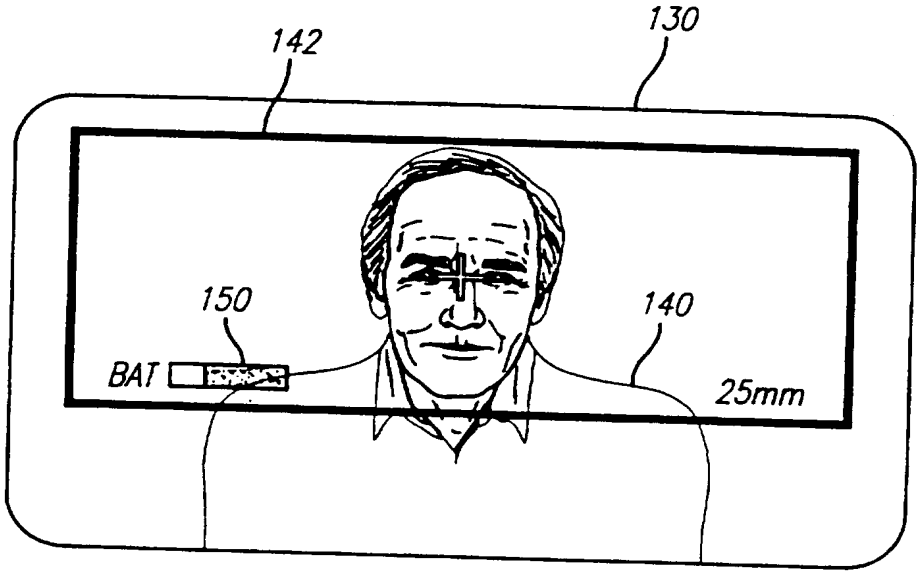


FIG. 7

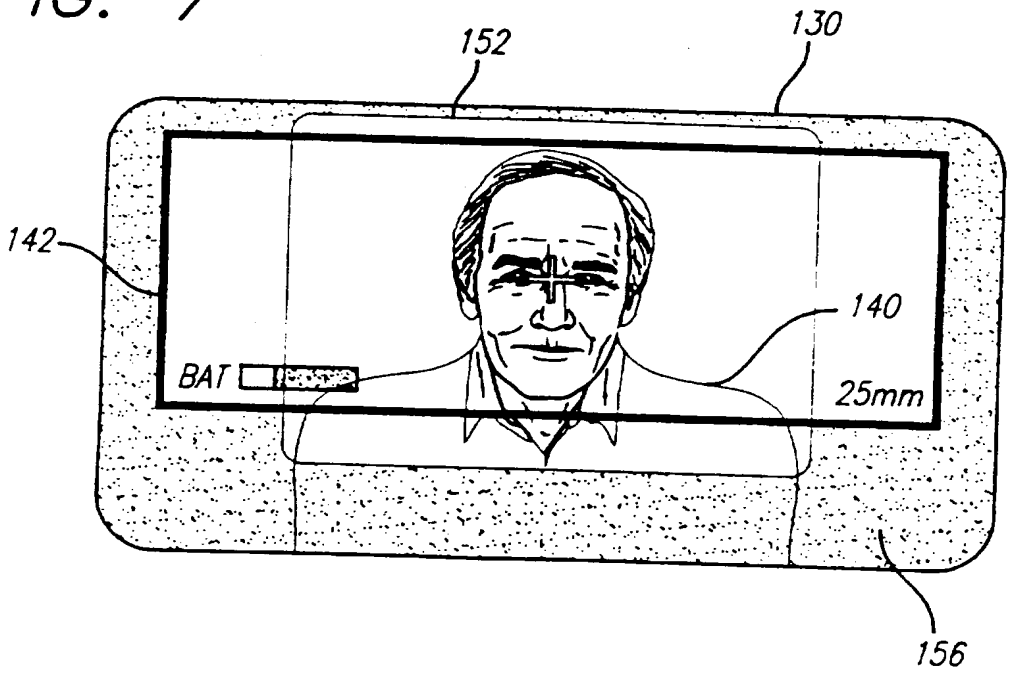
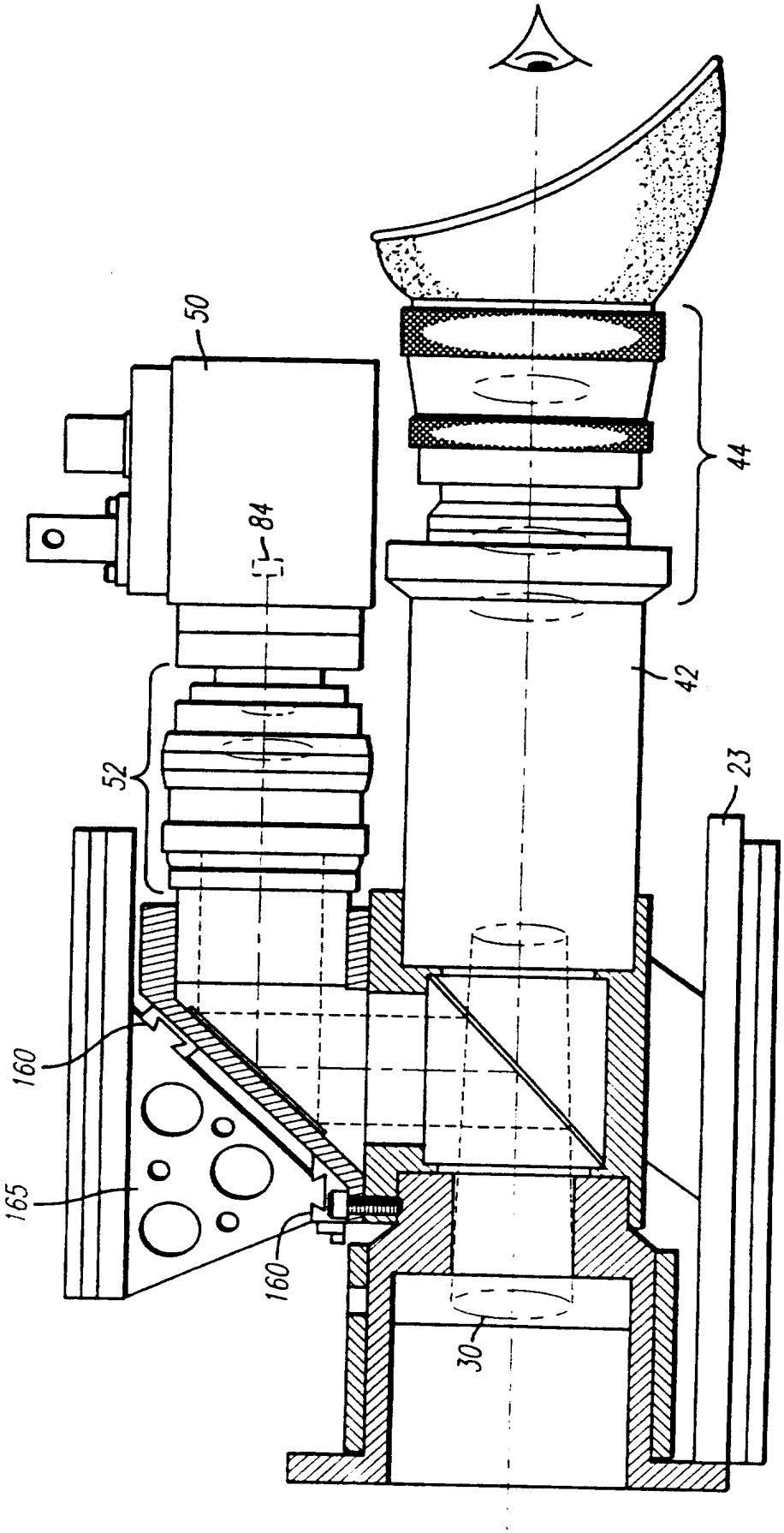


FIG. 8



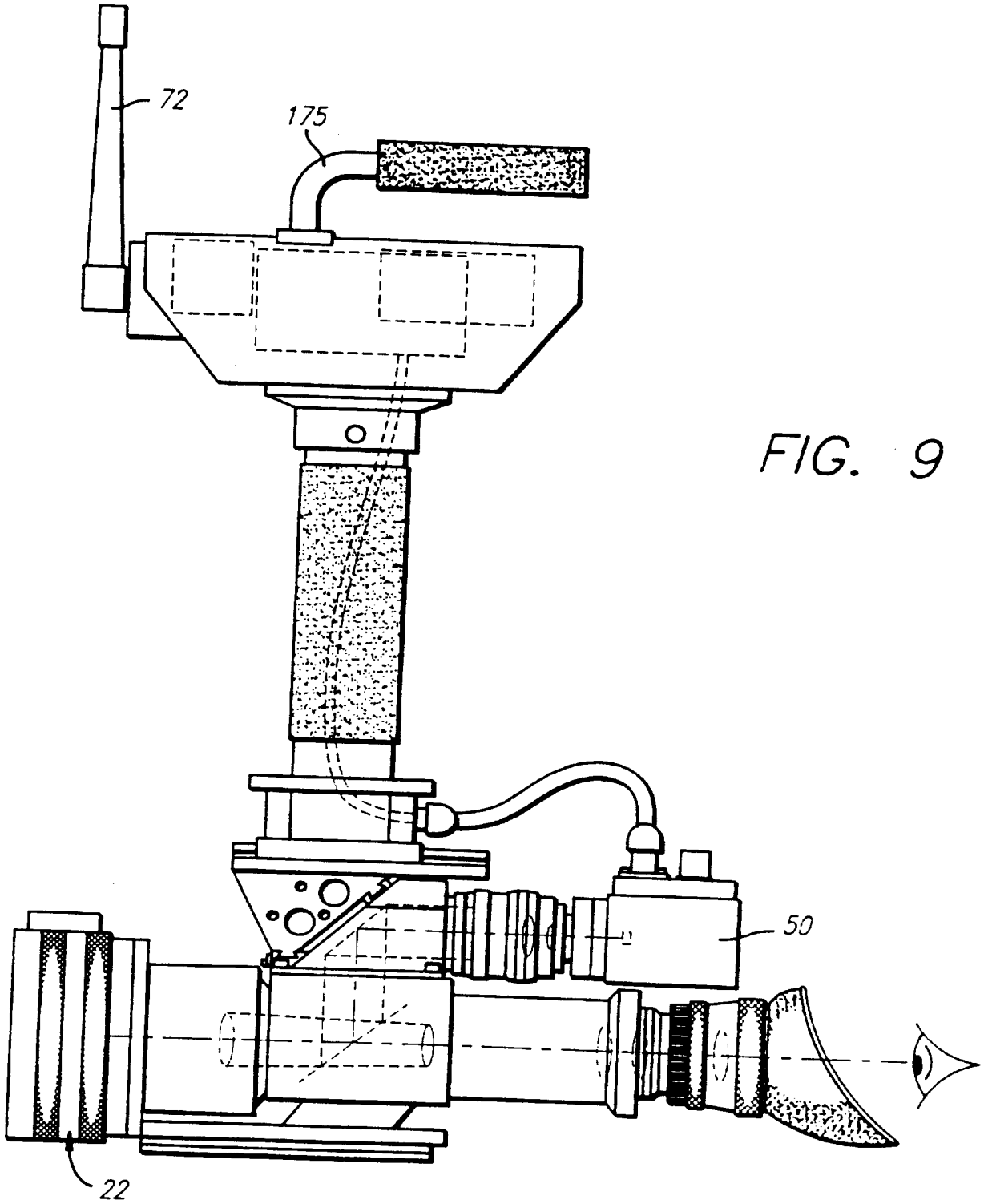


FIG. 9

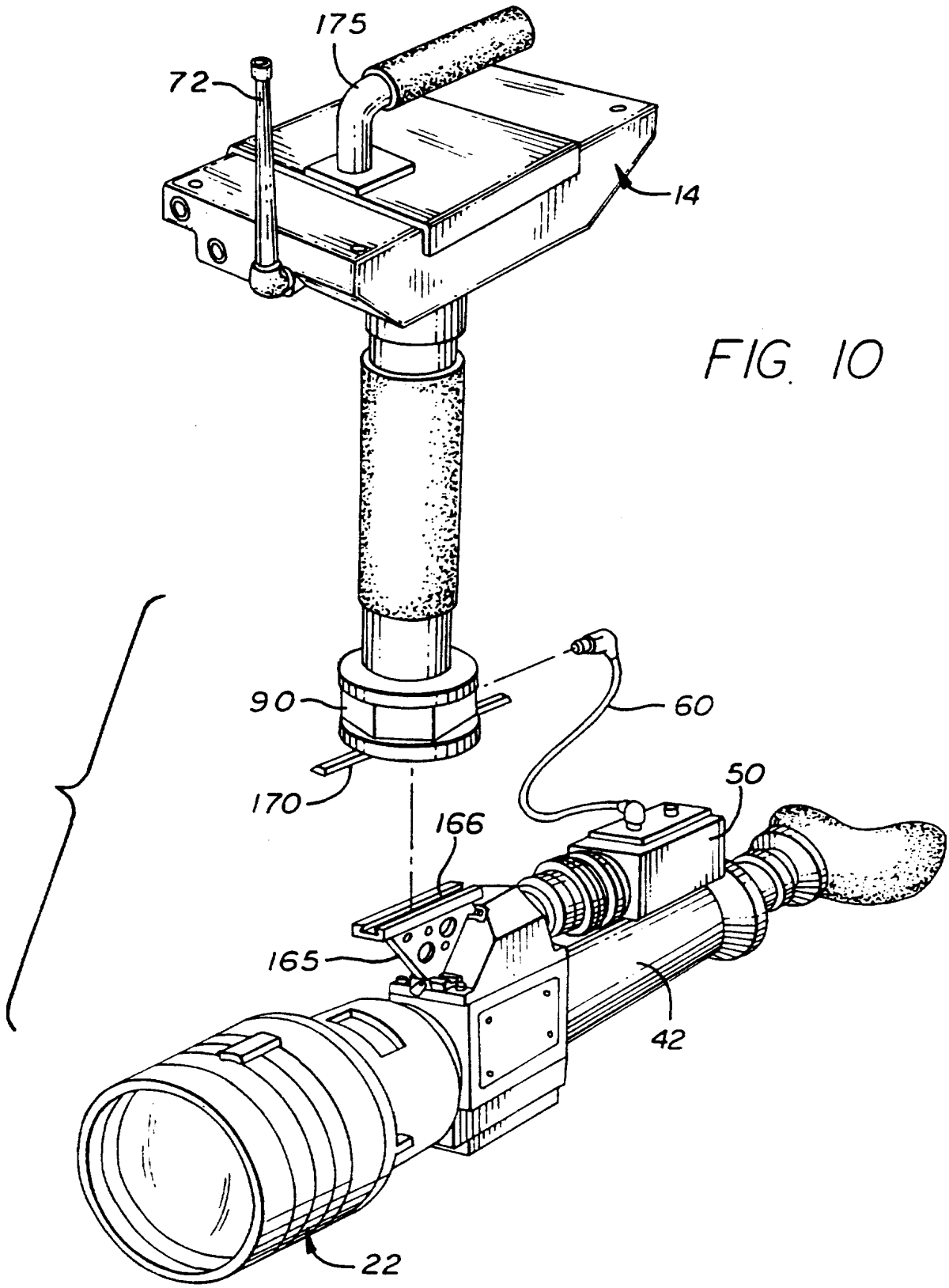


FIG. 10

FIG. 11

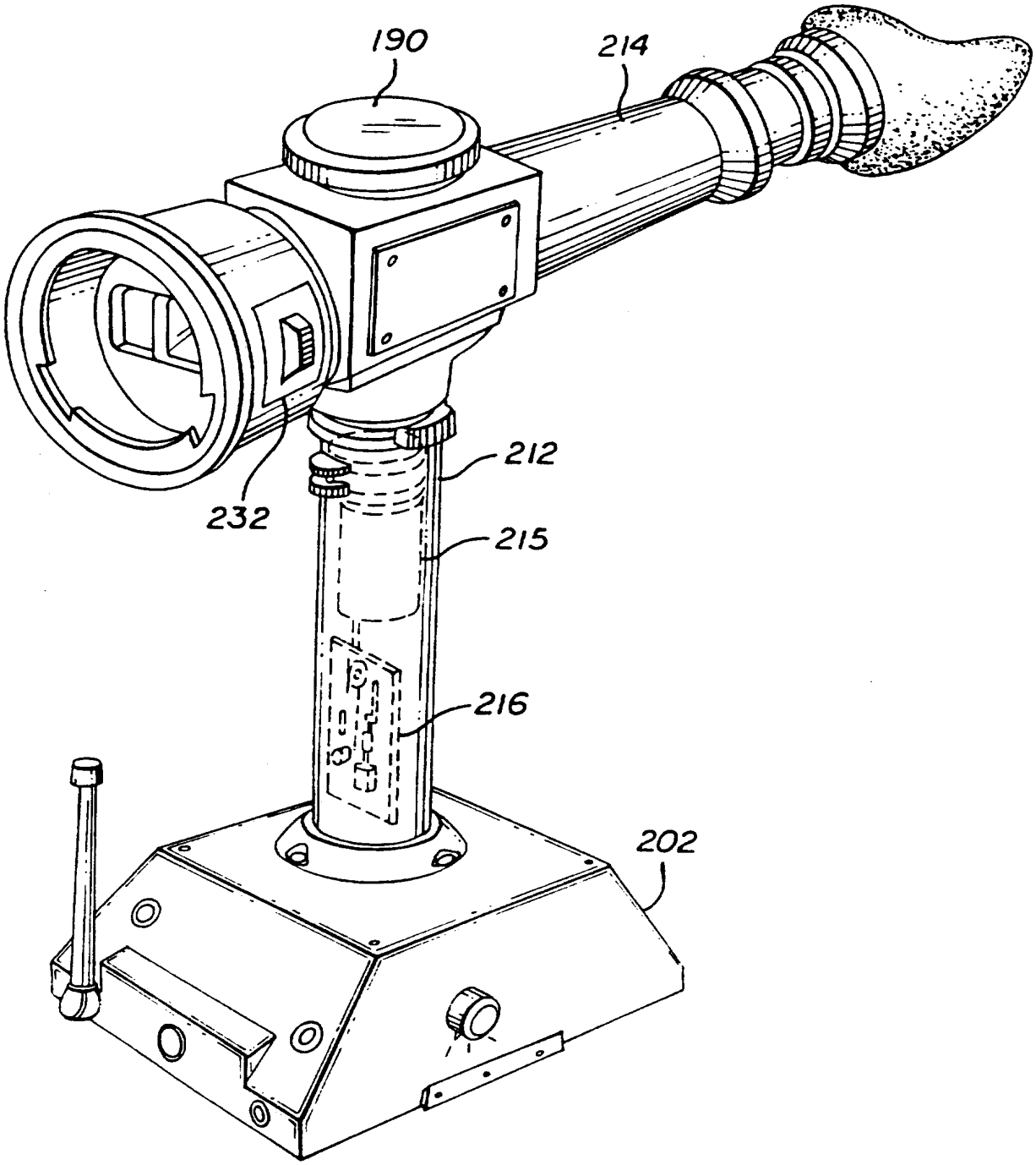


FIG. 12

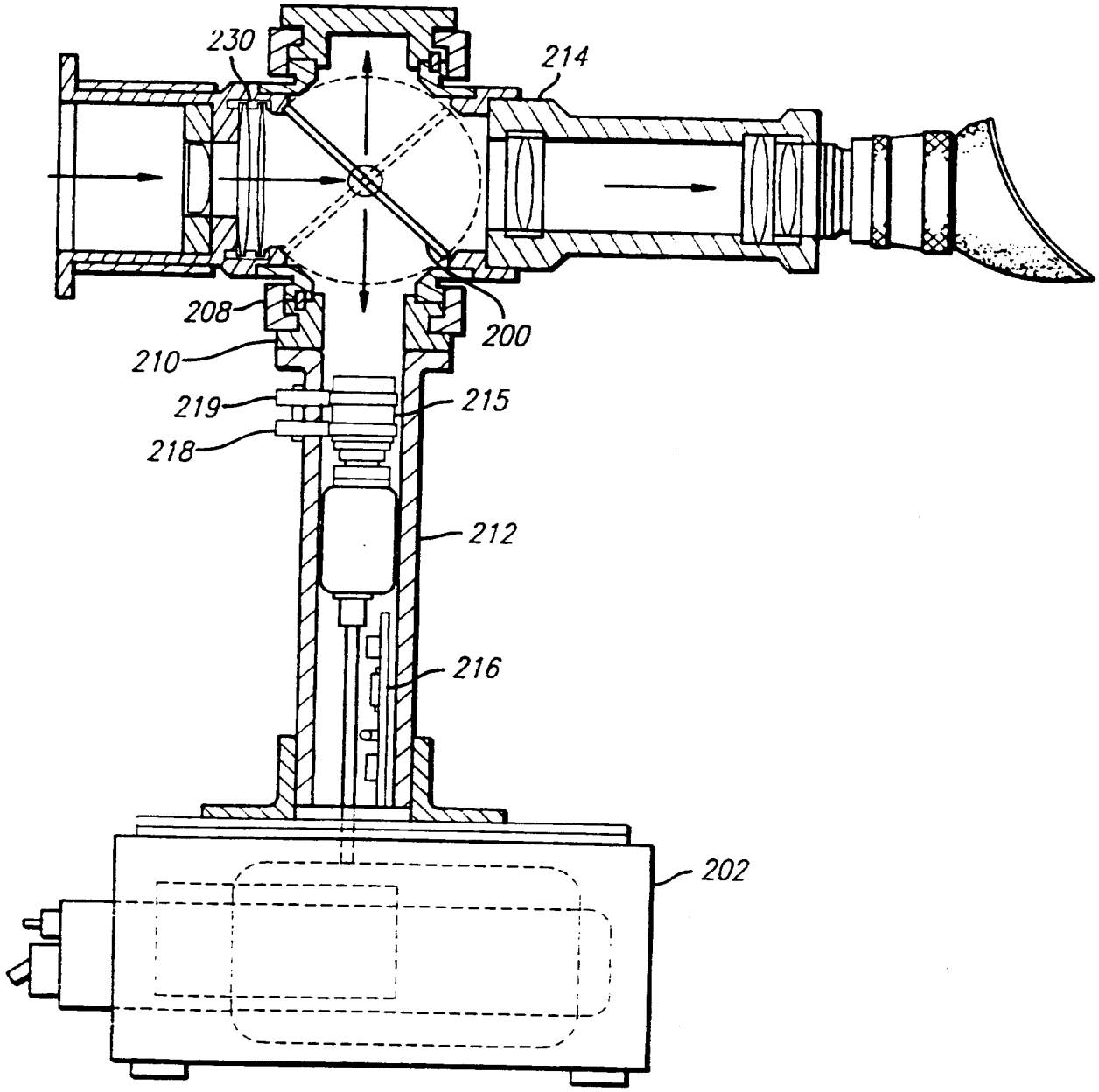
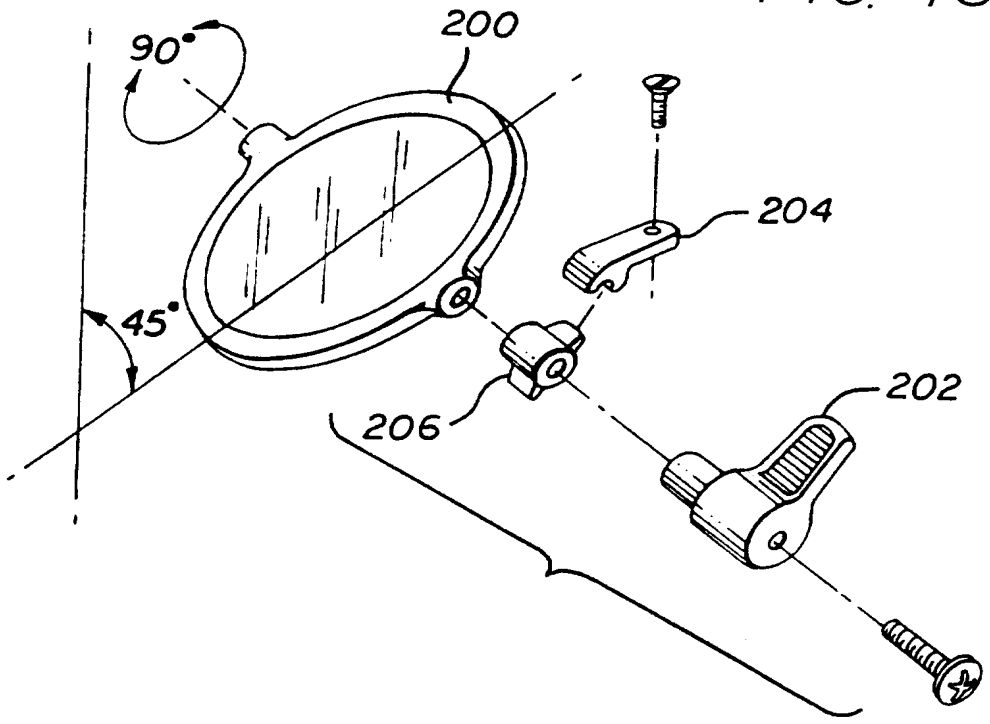


FIG. 13



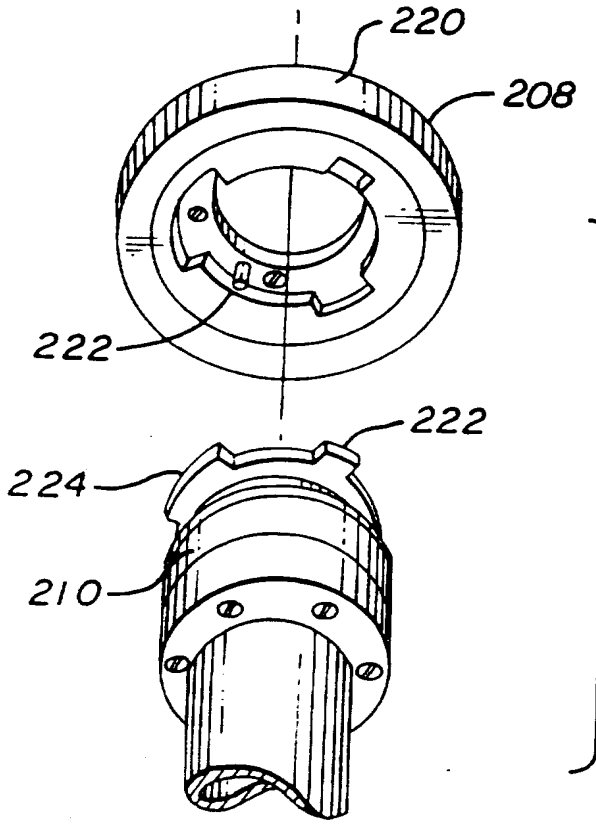


FIG. 15

FIG. 14

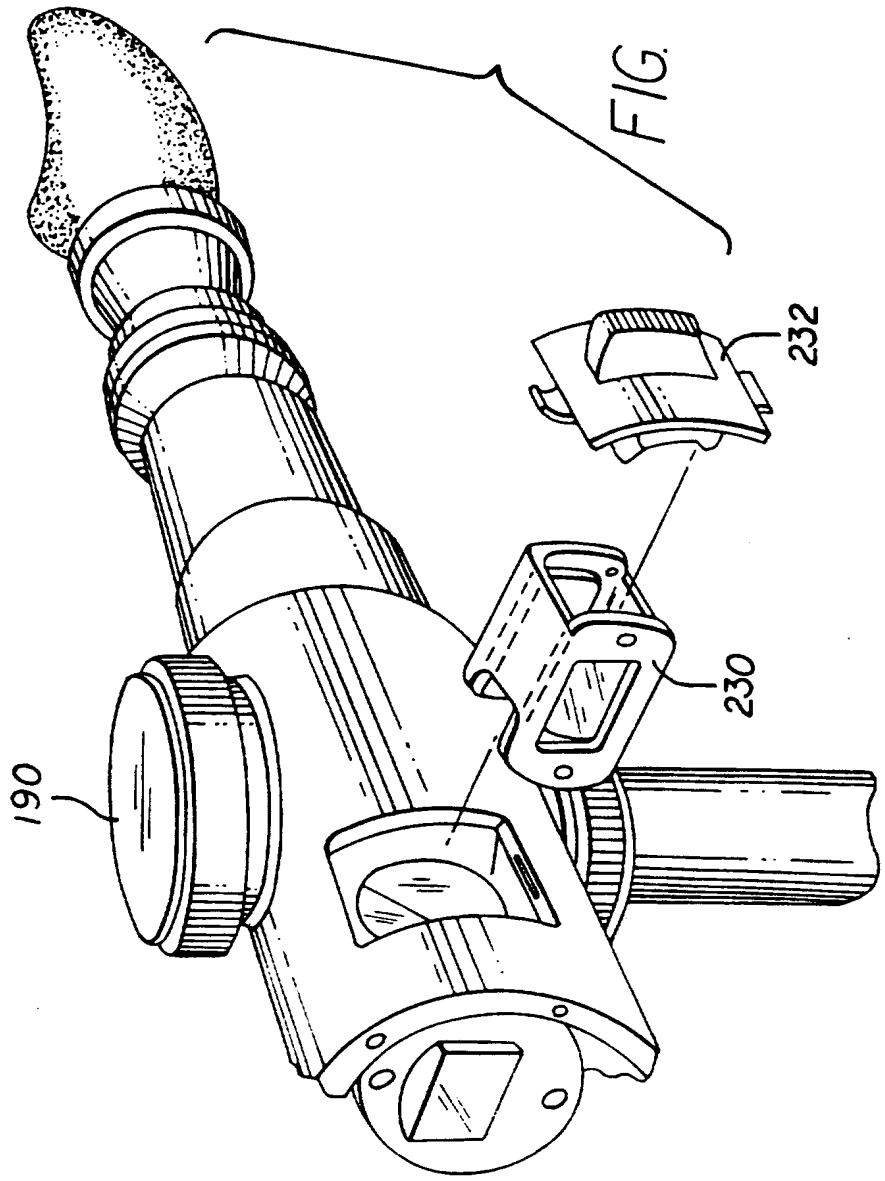
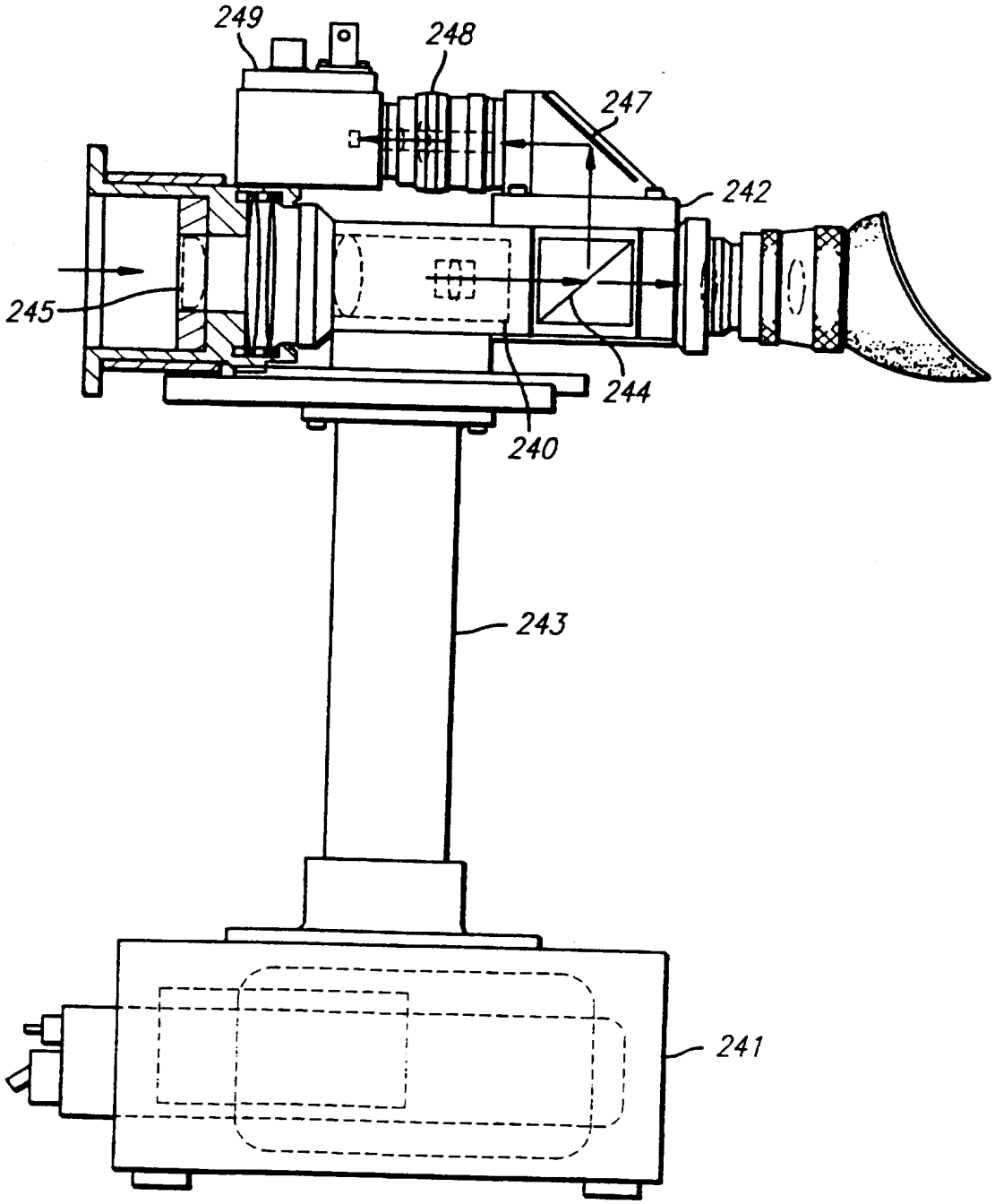


FIG. 16



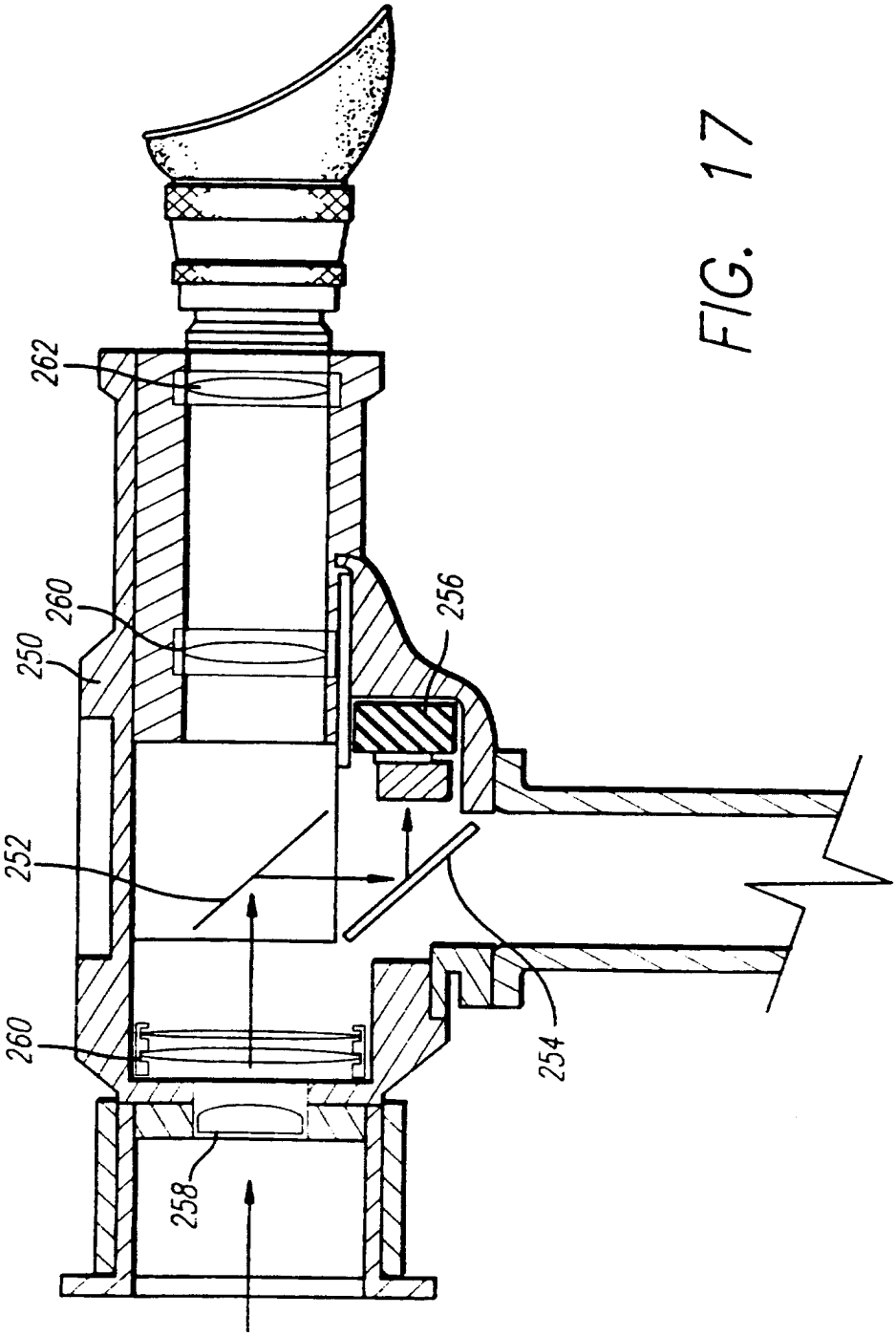


FIG. 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/03789

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 5/222, 5/225

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 348/373, 376, 344, 335, 341, 722, 352/131, 170, 171, 197, 242, 243

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS search terms: camera, viewfinder, aspect ratio, de-anamorphic lens

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US, A, 4,158,490 (GOTTSCHALK ET AL.) 19 JUNE 1979, FIGURE 1, COL. 1, LINES 61+, COL. 2, LINES 60+.	1, 18, 34, 36, 40-43 --- 2-12, 17, 19-25, 30, 37, 44
Y	US, A, 4,963,907 (INOUE ET AL.) 16 OCTOBER 1990, FIGURE 5, COL. 4, LINES 21+.	2-12, 17, 19-25
Y	US, A, 4,510,529 (GOTTSCHALK) 09 APRIL 1985, FIGURE 1 ELEMENT 15.	3-12, 17, 22-25, 30, 44
Y,P	US, A, 5,444,492 (KIHARA) 22 AUGUST 1995, FIGURES 9A-9C AND 10A-10D.	4-12, 17, 20-25

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 24 MAY 1996	Date of mailing of the international search report 11 JUN 1996
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer WENDY R. GARBER Telephone No. (703) 305-4929

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/03789

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, B, 06-038079 (TOOKADO K.K.) 10 FEBRUARY 1994, FIGURE 1, ABSTRACT	8-12, 17, 24-25
Y	US, A, 5,231,501 (SAKAI) 27 JULY 1993, FIGURE 7, CLAIM 1.	11-12
Y	US, A, 4,897,722 (FLORY) 30 JANUARY 1990, FIGURE 1a-1, ELEMENT 84.	33
A	US, A, 4,672,436 (HAWTHORNE) 09 JUNE 1987, FIGURE 1.	1-12, 17-25, 30, 33-34, 36-38, 40-44
A	US, A, 5,243,370 (SLATER) 07 SEPTEMBER 1993, FIGURES 1-2.	1-12, 17-25, 30, 33-34, 36-38, 40-44

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/03789

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

348/373, 376, 344, 335, 341, 722; 352/131, 170, 171, 197, 242, 243